a6 cancel

elements 194. The FLS curvilinear receive array has a center frequency between 500 Hz to 1 MHz with 192 elements.

In the Claims

Please amend Claim(s) 1, 2, 6, 7, 8, 9, 10, and 18. Amendments to the claims are indicated in the attached "Marked Up Version of Amendments" (pages 15-16).

a7

1. (Amended) A sonar beamforming system, comprising in combination:

a forward-looking sonar having transmit and receive transducer arrays and a programmable beamforming device formed on a single integrated circuit; and

at least one side-looking sonar having multi-element arrays and a second beamforming device formed on a second single integrated circuit.

2. (Amended) The system of claim 1, further comprising a downward-looking sonar having sufficient resolution for terrain mapping and object identification.

6. (Amended) A water craft, comprising in combination at least one of:

a forward-looking sonar having a transmit and receive transducer array and a programmable beamforming device formed on a single integrated circuit; and

a side-looking sonar having multi-element arrays and a beamforming device formed on a second single integrated circuit.

a8

7. (Amended) A forward-looking sonar comprising in combination:

a bistatic transducer array having a first transmit transducer array and a second receive transducer array;

a beamforming device formed on a single integrated circuit; and

a processing unit.

8. (Amended) A method for forming an integrated image comprising the steps of:

A

obtaining array signals from a forward-looking sonar having a programmable beamformer circuit formed on a single integrated circuit;

obtaining array signals from at least one side-looking sonar;

normalizing the array signals from the forward-looking sonar and the at least one side-looking sonar to generate normalized data using a personal computer platform; and

fusing the normalized data to generate an image.

a8 cncld

9. (Amended) An underwater unmanned vehicle system comprising in combination:

a forward-looking sonar having a transmit and receive transducer array and a beamforming device formed on a single integrated circuit; and

at least one side-looking sonar having a second transducer array and a beamforming device formed on a second integrated circuit.

10. (Amended) The system of claim 9, further comprising a downward-looking sonar having sufficient resolution for terrain mapping and object identification.

a9

18. (Amended) The system of claim 17, further comprising a high speed data bus interface connected to the interface controller and the memory circuit, the high speed data bus interface communicating with the central processor.

Please add new Claim(s) 21-32.

21. (New) The system of claim 1, wherein the beamforming device comprises a sampling circuit, a programmable delay circuit and a summing circuit.

a10

22. (New) The system of claim 21, further comprising a memory circuit in communication with the beamforming device.

23. (New) The system of claim 4, wherein the identification mode has a first frequency that is at least twice a second frequency of the detection mode.

24. (New) The forward-looking sonar of claim 7, wherein the beamforming device comprises a sampling circuit, a programmable delay circuit and a summing circuit.

25. (New) The forward-looking sonar of claim 24, further comprising a memory circuit in communication with the beamforming device.

26. (New) The method of claim 8, wherein the step of obtaining array signals from a forward-looking sonar further comprises disposing at least one curvilinear receive array.

27. (New) The method of claim 26, wherein the radius of the curvilinear array is approximately at least 3 inches.

28. (New) The method of claim 8, further comprising obtaining array signals from a downward looking sonar and fusing the normalized data with data generated from the array signals obtained from the downward looking sonar to provide for depth resolution.

29. (New) The method of claim 26, wherein a first curvilinear array provides for obstacle avoidance and a second curvilinear array provides for gap-filling.

30. (New) The method of claim 8, wherein the image is a three-dimensional bathymetric image.

31. (New) The system of claim 17, wherein the high speed data bus interface comprises a high speed serial data bus interface.

32. (New) The system of claim 17, wherein the high speed data bus interface comprises a high speed parallel data bus interface.